

**AMENDMENTS TO THE CLAIMS**

**Claim 1 (Currently Amended):** A diamond electron emission device comprising:  
a cathode having an electron emission face made of diamond; and  
a light emitting device comprising the cathode and another element of the light emitting device forming [[a]] an electroluminescent junction with the cathode;  
wherein the light emitting device generates light at the electroluminescent junction by electroluminescence and at least a portion of the light irradiates through the cathode toward the electron emission face.

**Claim 2 (Original):** A diamond electron emission device according to claim 1, wherein said light emitting device is made of diamond.

**Claim 3 (Previously Presented):** A diamond emission device according to claim 1, wherein said electron emission face of said cathode is an n-type diamond semiconductor.

**Claim 4 (Previously Presented):** A diamond emission device according to claim 1, wherein said electron emission face of said cathode is a p-type diamond semiconductor.

**Claim 5 (Original):** A diamond electron emission device according to claim 4, wherein said p-type diamond semiconductor includes crystal defects or an sp<sup>2</sup> component.

**Claim 6 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said electron emission face of said cathode is hydrogen terminated.

**Claim 7 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said electron emission face of said cathode is oxygen terminated.

**Claim 8 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said light emitting device is composed of a pn junction of diamond, a schottky junction

or a MIS structure.

**Claim 9 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said electron emission face of said cathode contains a sharpened projection part.

**Claim 10 (Previously Presented):** A diamond electron emission device according to claim 1, wherein wavelength energy of light emitted from said light emitting device includes 5.0 - 5.4 eV.

**Claim 11 (Previously Presented):** A diamond electron emission device according to claim 1, wherein wavelength energy of light emitted from said light emitting device is equal to or greater than 2.0 eV.

**Claim 12 (Previously Presented):** A diamond electron emission device according to claim 1, wherein light from said light emitting device excites electrons in an impurity level to a conduction band.

**Claim 13 (Previously Presented):** A diamond electron emission device according to claim 1, wherein light from said light emitting device excites electrons in a band gap level to a conduction band.

**Claim 14 (Previously Presented):** A diamond electron emission device according to claim 1, wherein light from said light emitting device excites electrons in a level resulting from any of following components of p-type diamond: graphite; non-crystalline carbon; diamond-like carbon; fullerene; lattice defect; dislocation defect or grain boundary defect, to a conductive band.

**Claim 15 (Original):** A diamond electron emission device according to claim 3, wherein said n-type diamond contains as an impurity at least one element among nitrogen, phosphorous, sulfur and lithium, or any one of said elements and boron.

**Claim 16 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said light emitting device is composed as one unit with said cathode.

**Claim 17 (Currently Amended):** An electron beam source utilizing a diamond electron emission device, comprising:

a cathode having an electron emission face made of diamond; and

a light emitting device for irradiating the cathode, wherein the light emitting device and the cathode are disposed together in an electron gun; and

an anode separated by a space from said electron emission face;

wherein the light emitting device comprises the cathode and another element of the light emitting device forming [[a]] an electroluminescent junction with the cathode, and the light emitting device generates light at the electroluminescent junction by electroluminescence and at least a portion of the light irradiates through the cathode toward the anode.

**Claim 18 (Previously Presented):** An electron beam source utilizing a diamond electron emission device according to claim 17, wherein:

a voltage that is positive relative to said cathode is applied to said anode.

**Claim 19 (Previously Presented):** An electron beam source utilizing a diamond electron emission device according to claim 17, wherein a control electrode is disposed between said cathode and said anode to regulate an emission electron current from said cathode.

**Claim 20 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said cathode comprises an n-type diamond and said other element comprises a p-type diamond.

**Claim 21 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said cathode comprises a p-type diamond and said other element comprises an n-

type diamond.

**Claim 22 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said cathode comprises a p-type diamond and said other element comprises a schottky electrode.

**Claims 23-24 (Canceled)**

**Claim 25 (Previously Presented):** A diamond electron emission device according to claim 1, wherein said electron emission face of said cathode contains a sharpened projection part; said light emitting device is made of diamond; and said light emitting device is composed as one unit with said cathode.

**Claim 26 (Previously Presented):** An electron beam source according to claim 17, wherein said electron emission face of said cathode contains a sharpened projection part; said light emitting device is made of diamond; and said light emitting device is composed as one unit with said cathode.